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E7.4-10.12.3

CR-136168

EREP MONTHLY PROGRESS REPORT - NUMBER 8

Period: November 16, 1973, to December 15, 1973

INVENTORY OF FOREST AND RANGELAND RESOURCES, INCLUDING FOREST STRESS

Registration No. 418

Contract No. T4106B

Principal Investigator: Robert C. Heller

Coinvestigators: Robert C. Aldrich  
Frederick P. Weber  
Richard S. Driscoll

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Report Written: December 22, 1973

N74-13050

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G3/13 00123

E74-10123) INVENTORY OF FOREST AND  
RANGELAND RESOURCES, INCLUDING FOREST  
STRESS Monthly Progress Report, 16 Nov.  
- 15 Dec. (Pacific Southwest Forest and  
Range Experiment) b5 p HC \$3.00 CSCI 02F

# INVENTORY OF FOREST AND RANGELAND RESOURCES, INCLUDING FOREST STRESS

## EREP Monthly Progress Report

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### A. Overall Status

#### 1. Atlanta, Georgia - forest inventory site (512)

No SL-2 or SL-3 overflights have been accomplished over this site. We are prepared to man this site and use the silicon vidicon airborne system beginning January 5, 1974 until the date of the last possible pass on January 15, 1974.

Several new components for the vidicon system will be employed during the January 1974 SL-4 coverage in Georgia. A stable, high quality video monitor was purchased primarily for laboratory data analysis. When the new monitor is used in the aircraft with the existing monitor, they will allow the pilot and copilot as well as the technicians operating the vidicon equipment to view the imagery. An audio pulse generator was purchased to synchronize the video tape with a chart recorder used in recording incident irradiance and scene radiance. The chart speed will now be controlled by a switching circuit connected to the video tape recorder.

#### 2. Black Hills, South Dakota - forest stress site (312)

During November we completed the qualitative analysis of SL-2 photographic data products (S190A and S190B), which was a required first step to a careful quantitative analysis using human photointerpretation and microdensitometry. The critical second phase of the analysis was stalled because of required modifications to both the I<sup>2</sup>S optical recombiner (which is used to make scaled color composite negatives) and the PDS 1000 microdensitometer.

From our work with photographic data up to now, we are encouraged by the following results: (1) S190B photography on the 9-1/2 inch format is good for forest classification within the Black Hills ecosystem. Four major ecosystem components were classified including ponderosa pine, hardwoods, pastures, and the oak-pine subsystem interface. (2) S190B photography on either the 4-1/2 or the 9-1/2 inch format can be used directly to detect some of the large mountain pine beetle infestations. We recognize that imagery from SL-2 will not provide a fair test of the capability for detecting and evaluating bark beetle damage, because it was taken at the worst possible time of year for detecting dead trees on the basis of foliage discoloration. The infestations that were detected consisted of dead trees that were at maximum discoloration eight months prior to SL-2 (September 1972). During the winter (1973) the dead foliage fell from the trees so that by June there were few remaining needles on the trees which are necessary for photographic detection. Without correlated aircraft photography, it will be difficult at best to project what EREP imagery might have been able to do in terms of accomplishing our intended goals.

Imagery from SL-3 have begun to arrive in Berkeley. Bore sighted 16 mm movie film of S191 for day 256 arrived during early December. We have viewed the film on our stop action movie projector, and while the film is interesting, it was impossible to find the Black Hills test site without the sensor correlation report. Furthermore, having been on the test site during the day 256 pass, we feel there is little hope of having imaged the Black Hills because of the overcast sky condition. However, there remains the possibility that the Bear Lodge mountains, north of Sundance, Wyoming was clear of clouds and that we can use that data. From our ground truth checks we know that the ponderosa pine in the Bear Lodge had some large infestations of dead timber. Thus we look forward to the receipt of photographic products (S190A and S190B) for day 256.

### 3. Manitou, Colorado - range inventory site (313)

CCT's and electronic screening imagery have just been received for SL-3, S192 data. We have only made a cursory first-look analysis of the electronic screening imagery for channels 2, 7, and 11 and can only say it looks satisfactory.

We have received the SL-3, S190A camera correlation reports. We have not received the photographic products.

We have received the S191 boresight camera pulse correlation report. Other than this document, we have received no other products.

We have had no comments from JSC about the SL-3, S190B products for site 313 except Mr. Kirby's comments in September that this sensor was operating at the time of the data-take pass on August 4, 1973.

We need to increase measurement precision for live plant foliage cover, plant litter, and bare ground using large-scale (1:600) sampling photographs in relation to ground measurements of these plant community parameters. The  $R^2$  values for these ground-photo measurements are now in the magnitude of 0.50 - 0.60. With more astute photointerpretation and measurements, these values should improve in an order of magnitude to 0.80 - 0.85. We will then proceed to develop a subsampling routine for making statements about these parameters in relation to plant community characteristics interpreted from aircraft (Mission 248) and SL-3 data.

#### B. Recommendations Concerning Decisions Required to Ensure Attainment of Experiment's Scientific Objectives:

##### 1. Atlanta, Georgia - forest inventory site (512)

We are most hopeful for good weather and operating conditions in SL-4 for overpasses scheduled for January 5, 10, and 15. This site has had no coverage to date and we will be unable to make statements about SKYLAB data relevant to forest inventory unless we get adequate coverage. If good data are taken, we will request an extension of our contract expiration date to allow for processing, analysis and reporting.

##### 2. Black Hills, South Dakota - forest stress site (312)

We must receive the S-192 multispectral scanner computer tapes by January 20, 1974 or it will be necessary to renegotiate our subcontract for processing with the University of Kansas. We have previewed the three image strips sent to Berkeley, and believe that the data will be adequate for computer analysis.

It would be helpful to receive the SL-3 photographic products as early as possible. We require a rather long time to prepare the imagery for analysis, thus we will be running close to the end of the contract before a quantitative analysis of the products can be started.

##### 3. Manitou, Colorado - range inventory site (313)

We need to make comparative examinations of SL-2 and SL-3 S190A photographic products before any recommendations are made regarding the objectives.

#### C. Expected Accomplishments:

##### 1. Manitou, Colorado - range inventory site (313)

We should be in position to make comparative statements about EREP data for plant community classification relative to temporal changes once our SL-3 photographic products are received. Progress was not as

rapid as expected on relating Mission 239 aircraft data to SL-2, S190A products. We hope to make statements about these relationships for plant community classification in next month's report.

D. Significant Results, Practical Applications, and Operational Problems:

1. All sites - None at present

E. Summary Outlook:

1. We hope to be able to begin reporting significant results on our range and stress sites by the next monthly report.

F. Travel Plans - December 16, 1973 to January 15, 1974

1. Atlanta, Georgia - forest inventory site (512)

Aldrich and Greentree will travel to Atlanta on January 2, 1974 by commercial airlines. They will gather ground data, remain until an EREP pass is successful, but not later than January 16, 1974.

The U. S. Forest Service Aero Commander will be flown to Atlanta on January 4, 1974 to make correlative silicon vidicon flights at the time of the EREP over-pass. Four people are needed on the silicon vidicon flights.

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UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

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December 26, 1973

[- National Aeronautics and Space Administration  
Scientific and Technical Information Facility  
Code KS  
Washington, D.C. 20546  
Mark For: T-4106B  
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Dear Sir:

Please find enclosed our eighth Progress Report relating to the activities of our proposal number 418 "Inventory of Forest and Rangeland Resources, Including Forest Stress". Our contract is number T-4106B. The report covers a one-month period--

November 16, 1973, through December 15, 1973.

Sincerely,

ROBERT C. HELLER  
Principal Investigator

Enclosures